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10/550,266	09/21/2005	Thomas Stocker	WACHP008	1336

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EXAMINER	
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ART UNIT	PAPER NUMBER
2192	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/550,266	STOCKER, THOMAS	
	Examiner	Art Unit	
	Erika Kretzmer	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 12-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 12-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/23/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. This action is in reply to the application filed on September 21, 2005. Preliminary amendments to the claims were received on September 21, 2005. Claim 11 was cancelled. Claims 1-10 and 12-25 are currently pending and have been examined. Application claims priority to International Application (number PCT/EP 2004/003004) filed on March 25, 2003. The application is accepted as a national stage application under 35 USC 371 and 37 CFR 1.495.

Information Disclosure Statement

2. The Information Disclosure Statement filed on December 23, 2008 has been considered. An initialed copy of Form 1449 is enclosed herewith.

Drawings

3. Original drawings 1-4 were received on September 21, 2005. Drawings 1-4 are accepted.

Specification

4. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code on page 1, line 6. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP §608.01. Examiner suggests replacing the hyperlink with a uniform resource locator enclosed in angle brackets ("<java.sun.com/products/javacard>").

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 9 (lines 2 and 3), 20 (lines 1 and 2), and 25 (line 2) contain the trademark/trade names Java Card™. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a type of portable data carrier and, accordingly, the identification/description is indefinite.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. §101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 21-25 are rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter.

9. Claim 21 is drawn to "a computer program product having program instructions for causing a processor of a portable data carrier to perform a method". Tangibly embodied instructions for a computer do constitute patentable subject matter. However, applicant states in paragraph 0018 liens 6-7 that, in their conception, a computer-readable medium may include a "non-physical medium" such as "a signal transmitted via a computer network." Such a signal is not statutory

subject matter. See, e.g., In re Nuitjen, Docket no. 2006-1371 (Fed. Cir. Sept. 20, 2007)(slip. op. at 18)("A transitory, propagating signal like Nuitjen's is not a process, machine, manufacture, or composition of matter.' ... Thus, such a signal cannot be patentable subject matter."). Examiner suggests drawing these claims to a tangible computer program product as described in paragraph 0018.

10. Claims 22-25 are rejected as depending from a rejected claim. These claims do not limit the scope of the parent claim to restrict the "computer program product" to patentable subject matter.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 1-10, and 12-25 are rejected under 35 U.S.C. §103(a) as being unpatentable as obvious over Osen (EP 1,271,317 A1), in view of Starovic et al. (US 6,625,751 B1).

Claim 1

Osen teaches *a method for the controlled execution of a program* ("jobs"), *the program being intended for a* job *on a portable data carrier* ("System-on-Chip") (see at least page 2 right column, paragraph 10). Osen further teaches that the method comprises:

- *the data carrier has a processor which executes at least a first and a second* job (see at least page 2 right column, lines 30-33, particularly: "a System-on-Chip comprising an operating system designed to execute jobs in a sequential manner").
- *the program is executed both by the first and by the second* job (see at least page 2 right column, lines 34-36, particularly: "means to repeat jobs at least twice").

- *an operating state of the first* job *and an operating state of the second* job *are checked during execution of the program for correspondence,* (see at least page 2 right column, lines 35-36, particularly: "comparison means to validate the results from repeated jobs by checking the output data for equivalency").
- *execution of the program is aborted if a difference is found between the operating state of the first* job *and the operating state of the second* job (see at least page 2 right column, lines 38-40, particularly: "means to launch of an exception handler in case of unsuccessful comparison").

Osen teaches the program is intended for execution by a smart card ("System-on-Chip", see at least page 2 column 2 paragraph 10). Osen further teaches that the jobs run in an "operating system" (see at least page 2 left column lines 34-36). Osen does not explicitly teach that the jobs are executed in separate *virtual machines*. However, Starovic teaches *virtual machines* (see at least column 5, lines 64-65: "a Java VM"). Starovic further teaches separate virtual machines for the repeated execution of the same program (see at least figure 4, "primary VM replica" and "secondary VM replica"). It would have been obvious to one of ordinary skill in the art to combine the smart card operating system of Osen with the virtual machines of Starovic because a smart card operating system is suitable for a virtual machine which "forms a general information and execution engine for application code" (see at least Starovic, column 6, lines 2-7).

Claim 10

Claim 10 is directed to a system implementing the method of claim 1. Osen teaches a portable data carrier (page 2 paragraph 5 "System-on-Chip") having a processor (page 2 paragraph 5 "microprocessor") and an operating system (page 2 paragraph 3 "Operating System"). Osen further teaches the limitations of claim 1, as shown above.

Claim 21

Claim 21 is directed to a computer program product implementing the method of claim 1. Osen teaches a computer program product having program instructions for causing the method of claim 1 (see at least page 2, paragraph 3, particularly: "Operating System"). Osen further teaches the limitations of claim 1, as shown *supra*.

Claims 2 and 13

Claim 2 includes all of the limitations of claim 1. Claim 13 includes all of the limitations of claim 10. Starovic also teaches comparing the operating states of two virtual machines sequentially running the same program. Starovic further teaches that *the state of a program counter of the first virtual machine is the same as the state of a program counter of the second virtual machine* (see at least column 13, lines 50-60, particularly: "the heartbeat messages can contain ... state (or signature of state) information ... Such state information can include ... a state of each thread"). A state of each thread is a program counter because it includes the address of the next instruction to be processed (see at least column 13, line 62: "making progress"). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the comparing step of Osen to include the comparing of the program counter of Starovic because it would assist in "faster and more accurate failure detection" (see at least Starovic column 13 lines 53-54) thus allowing the system to "reliably detect failures" and "take corrective action before harm is made" (Osen page 2 column 2 paragraph 9).

Claims 3 and 14

Claim 3 includes all of the limitations of claim 1. Claim 14 includes all of the limitations of claim 10. Osen further teaches that state information such as the level of the stack pointer is examined for a single job (see at least page 3, column 4, lines 39-41, particularly: "Verifying that the stack pointer is in a range of legal values.") Osen does not teach that the level of the stack pointer is compared between the two jobs. However, Starovic teaches comparing the operating states of

two virtual machines sequentially running the same program, including state information (see at least column 13, lines 50-53). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the state information including stack pointer of Osen with the comparing of state information of Starovic because it would assist in "faster and more accurate failure detection" (see at least Starovic column 13 lines 53-54) thus allowing the system to "reliably detect failures" and "take corrective action before harm is made" (Osen page 2 column 2 paragraph 9).

Claims 4 and 15

Claim 4 includes all of the limitations of claim 1. Claim 15 includes all of the limitations of claim 10. Osen further teaches that state information such as a value of the most recent element in a stack associated with the first job is the same as a value of the most recent element in a stack associated with the second job (see at least page 2, column 2, lines 36-38, particularly: "checking the output data for equivalency"). It would have been obvious to one of ordinary skill in the art at the time of the invention that output data are a stack because the output data is information stored sequentially in a memory.

Claims 5 and 16

Claim 5 includes all of the limitations of claim 1. Claim 16 includes all of the limitations of claim 10. Osen teaches that *checking of the operating state is in each case performed after an instruction of the program has been executed both by the first and by the second* job (see at least page 3, column 4, paragraph 0024 "When a job has been executed twice, the comparing of the results may either validate or invalidate the result.") As shown above for claim 1, Starovic teaches that the job can be a virtual machine.

Claims 6 and 17

Claim 6 includes all of the limitations of claim 1. Claim 17 includes all of the limitations of claim 10. Osen teaches *the first and the second* job *access a common heap* ('list") *in a non-volatile memory of the data carrier* (see at least page 3, column 3, lines 20-37, particularly: "For memory consumption reasons the second job does not save the physical addresses in a list, but only uses said addresses to compute the CRC-32.") Because the first and second job both use the data stored in memory for comparison, they both access a common heap. As shown above for claim 1, Starovic teaches that the job can be a virtual machine.

Claims 7, 18, and 23

Claim 7 includes all of the limitations of claim 6. Claim 18 includes all of the limitations of claim 17. Claim 23 includes all of the limitations of claim 22. Osen teaches that a write operation to the common heap is preferably executed only by the first virtual machine ("job") (see at least page 3, column 3, lines 20-37, particularly: "For memory consumption reasons the second job does not save the physical addresses in a list, but only uses said addresses to compute the CRC-32.") Because the first and second virtual machine both use the data stored in memory for comparison, they both access a common heap.") However, Osen does not explicitly teach that *a write operation is only performed by the first virtual machine.* Starovic teaches that certain types of actions ("non-deterministic choices") are only performed by the first virtual machine (see at least column 8, lines 58-61, particularly: "In passive replication there is a distinguished or primary replica and the other replicas are backups or secondaries. The primary resolves the non-deterministic choices and informs the backups about its decisions.") Starovic further teaches that these actions taken only by the first virtual machine include a write operation (see at least column 9, lines 17-20, particularly: "write to the environment"). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the writing to the common heap of Osen with the restriction that all writing is performed by the first virtual machine of Starovic

because it would "maintain both internal and external consistency of the VM replicas" (Starovic, column 9, lines 20-23).

Claims 8, 19, and 24

Claim 8 includes all of the limitations of claim 7. Claim 19 includes all of the limitations of claim 18. Claim 24 includes all of the limitations of claim 23. Osen teaches that *instead of performing the write operation, the second virtual machine* ("job") *checks whether a value that is to be written is present in the heap at the location that is to be written to* (see at least page 3, column 3, lines 20-35, particularly: "To check the correctness of the list created in the first job it is sufficient to check that the CRC-32 resulting from both jobs are identical. ") Osen does not explicitly teach that *the instruction of the program is executed first by the first virtual machine and then by the second virtual machine*. However, Starovic teaches sequential execution of the first ("primary") virtual machine and then the second ("replica" or "backup") virtual machine (see at least column 8, lines 62-63: "The state of the backups can be more or less tightly synchronized with the state of the primary, but the backups are always behind the primary.") It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the first and second virtual machine as disclosed by Osen with the sequential execution of the first and second virtual machines as disclosed by Starovic because it would allow the first virtual machine to compute a result and store it, and the second virtual machine to subsequently check whether the stored value is correct.

Claims 9, 20, and 25

Claim 9 includes all of the limitations of claim 1. Claim 20 includes all of the limitations of claim 10. Claim 25 includes all of the limitations of claim 21. Osen teaches *the program is intended for execution* by a smart card ("System-on-Chip", see at least page 2 column 2 paragraph 10). Osen does not teach a *Java Card Applet* running on a *Java Virtual Machine*. Starovic teaches a *Java Virtual Machine* (see at least column 5, lines 64-65: "a Java VM"). Starovic further teaches an

application running on a Java Virtual Machine (see at least column 5, lines 62-67, particularly: "application code in a VM such as, for example, a Java VM"). A Java application is an applet. It would have been obvious to one of ordinary skill in the art to combine the system on a chip of Osen with the Java Virtual Machine and Java applet of Starovic because it is an exemplary type of smart card technology which "forms a general information and execution engine for application code" (see at least Starovic, column 6, lines 2-7).

Claim 12

Claim 12 includes all of the limitations of claim 10. Osen further teaches that the portable data carrier is a *chip module* (see at least page 2 paragraph 2: "By 'System-on-Chip', it is meant an electronic module packaged as a single chip").

Cited Prior Art

13. "Overview about attacks on smart cards" (Rankl, 2003) is cited because it speaks to at least claims 1 and 9 (see at least page 81, right column, third paragraph: "The simplest defence is to calculate the crypto-algorithm in the smart card twice and to compare the two results").

14. "AR-SMT: Coarse-Grain Time Redundancy for High Performance General Purpose Processors" is cited because it speaks to claims 6-8 (see at least page 9, paragraph 4, particularly: "both streams share the same register and memory state").

15. **Examiner's Note**: The Examiner has pointed out particular references contained in the prior art of record within the body of this action for the convenience of the Applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply. Applicant, in preparing the response, should consider fully the entire reference as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Conclusion

16. Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **Erika Kretzmer** whose telephone number is **(571) 270-5554.** The Examiner can normally be reached Monday through Thursday, 9:30am-6:00pm Eastern Time. If attempts to reach the examiner are unsuccessful, the Examiner's supervisor, **Tuan Dam** can be reached at **(571) 272-3695**.

17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://portal.uspto.gov/external/portal/pair . Please direct questions on access to the Private PAIR system to the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

18. Any response to this action should be mailed to:

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or faxed to 571-273-8300. Hand delivered responses should be brought to the United States Patent and Trademark Office Customer Service Window:

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/Erika Kretzmer/

Examiner, Art Unit 2192

August 14, 2009

/Tuan Q. Dam/
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